

REMARKS

In the present amendment, claim 1 has been amended and new claims 15 and 16 have been added. Accordingly, claims 1-16 are pending in the application, with claims 1 and 9 being independent. Of the pending claims, claims 1, 2, and 4-8 are under consideration and claims 9-12 and 14 are withdrawn from consideration.

Applicants note that claim 1 has been amended to add process conditions for the formation of three dimensional nanotunnel layers having pluralities of three-dimensionally connected nanotunnels. Support for the amendment can be found, e.g., in paragraphs [0040] and [0041] of the originally filed application.

New dependent claim 15 has been added to recite the diameter range of the pores of the substrate, which is supported in paragraph [0021] of the specification.

New dependent claim 16 has been added to specify the dispersant of present claim 1. Support for new claim 15 can be found, e.g., at page 8, paragraph [0036].

Response to Rejection under 35 U.S.C. § 112, first paragraph

The Office Action rejects claims 1, 2, and 4-8 under 35 U.S.C. § 112, first paragraph, as allegedly not being enabling. The Office asserts that essential parameters of the invention are not included in the claims, i.e., "the diameter of the fine pores of the substrate, porosity of the substrate and average thickness of the three-dimensional nanotunnel layers and average diameter of the nanotunnels together."

Applicants respectfully traverse the rejection. Applicants submit that the presently claimed invention includes all necessary elements of the invention. For example, claim 1 recites all that is necessary to provide a ceramic body in accordance with the invention. Further, original claim 2

recites an average thickness of the three-dimensional nanotunnel layers of 20 nm to 10 μ m, which is supported by the specification, paragraph [0023]. Furthermore, original claim 6 recites pluralities of three-dimensionally connected nanotunnels formed on wall surfaces having openings communicating with the fine pores of the substrate with an average diameter of 1 to 5000 nm, which is supported by the specification, paragraph [0025].

Moreover, Applicants note that new claim 15 recites that the pores of the substrate have diameters of 50 to 500 μ m. Support for new claim 15 can be found in paragraph [0021] of the present specification.

In view of above presented arguments and newly added claim 15, Applicants believe that all necessary parameters of the invention are included in the claims, wherefore withdrawal of the enablement rejection is respectfully requested.

Response to Rejections under 35 U.S.C. § 103(a)

The Office Action rejects claims 1, 2, and 4-6 under 35 U.S.C. § 103(a), as allegedly being unpatentable over JP 03-065579, hereinafter "JP'579," in view of U.S. Patent No. 4,626,392 to Kondo, hereinafter "KONDO." The Office Action asserts that JP'579 teaches all elements of the presently claimed invention, except that "JP'579 does not specifically disclose a method of immersing the substrate in a calcium phosphate slurry followed by defoaming the slurry under reduced pressure so as to form three-dimensional nanotunnel layers in the fine pores inside the substrate." The Action alleges that KONDO teaches the deficiency of JP'579, by teaching a method of immersing a porous ceramic substrate in a calcium phosphate slurry, followed by defoaming under reduced pressure, referring to KONDO, column 3, lines 10-20 and lines 50-55.

Applicants respectfully traverse this rejection as well. Applicants submit that in an attempt to advance prosecution of the application and without expressing agreement with or acquiescence to the rejection, independent claim 1 has been amended to render the rejection moot.

Applicants note that present claim 1 recites “mixing together calcium phosphate particles, a dispersant and water to form a slurry in a single dispersion state or near a single dispersion state.” The importance of a dispersant is disclosed in paragraph [0042] of the present specification, which further explains that “specific examples of the dispersant may be the same as the surfactants usable in the production of the “porous calcium phosphate ceramic body, and which are listed in paragraph [0036] of the present specification. In contrast, KONDO does not teach the use of a dispersant / surfactant and also does not disclose the requirement that the slurry is in a single dispersion state or near a single dispersion state. As taught in detail by the present specification, paragraph [0041], “when the slurry is not in a single dispersion or near a single dispersion state, the slurry contains large particles and small particles, failing to provide three-dimensional nanotunnel layers with uniform thickness and nanotunnel diameters.”

Moreover, KONDO teaches away from the present invention and does not disclose or suggest a material with three-dimensionally connected nanotunnels formed in the fine pores inside the substrate according to the presently claimed invention. KONDO merely teaches filling the pores of the substrate with a first powder, and “following sintering, the surface of the porous material is coated with a fine apatite powder or a finely pulverized mixture of apatite and a calcium phosphate base frit.” See KONDO, Abstract. Accordingly, KONDO applies two layers in two separate steps. After the first step, KONDO teaches sintering the material under atmospheric pressure at 1,550°C (KONDO, column 3, lines 54-55). Applicants note that under

by the present specification, paragraph [0050]: "..., when the heat treatment temperature is higher than 900°C, calcium phosphate particles themselves are excessively fused to each other to become dense, thereby losing the three-dimensional nanotunnel structure." Even if the second treatment method in KONDO would also be an immersion treatment, the fine pores on the outside of the substrate would already be blocked, wherefore a three-dimensional nanotunnel structure could not be formed.

Accordingly, someone of ordinary skill in the art would not have been guided by the disclosure of KONDO to create pluralities of three-dimensionally connected nanotunnels formed in the fine pores inside the substrate. Even in the unlikely event that such a structure would have been formed by immersion, KONDO would destroy such structure by the following heat treatment conditions.

In view of the amendments of the claims and above presented arguments, KONDO does not teach or suggest the deficiency of JP'579. Further, even assuming the combination of JP'579 and KONDO would be proper, it would not lead to the presently claimed invention. Accordingly, withdrawal of the obviousness rejection of claims 1, 2, and 4-6 is respectfully requested.

The Office Action rejects claims 7 and 8 under 35 U.S.C. § 103(a), as allegedly being unpatentable over JP'579, in view of KONDO, and further in view of JP 2003-073182, hereinafter "JP'182."

Applicants note that the obviousness rejection of claims 7 and 8 is based on the assumption that claim 1 is obvious over JP'579 in view of KONDO. Applicants submit that at least for the reasons discussed above, claim 1 is not obvious over JP'579 in view of KONDO. Claims 7 and 8 merely specify certain features of the invention, and depend ultimately from claim

1. Accordingly, claims 7 and 8 are patentable for the same reasons that claim 1 is patentable over JP'579 in view of KONDO.

Moreover, JP'182 does not cure or supply the deficiency of JP'579 and KONDO. For example, JP '182 fails to disclose the technical feature of claim 1 that a dispersant is added to form a calcium phosphate slurry in a single dispersion state or near a single dispersion state.


Applicants respectfully request withdrawal of the obviousness rejections of claims 7 and 8 as well.

CONCLUSION

In view of the foregoing amendments and remarks, the Examiner is respectfully requested to reconsider and withdraw the rejections of record, and allow each of the pending claims. Applicants therefore respectfully request an early indication of allowance of the application be indicated by the mailing of the Notices of Allowance and Allowability.

Should the Examiner have any questions regarding this application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
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